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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/576,025	04/17/2006	Shinichi Takeshima	127734	8754

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EXAMINER	
SLIFKA, COLIN W	

ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/576,025	TAKESHIMA ET AL.	
	Examiner	Art Unit	
	COLIN W. SLIFKA	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9* is/are pending in the application.

4a) Of the above claim(s) *6-9* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *17 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/12/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1states that "...an elongation...assumes a *nearly* theoretical value." In this instance, "nearly" is indefinite because it is an approximation with no assigned value, and is therefore arbitrary. All dependant claims are likewise rejected. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto (US 5,814,576) in view of Takeshima (US 2004/0171483).

Yamamoto teaches a zirconium oxide composition represented by the general formula $[X]_aZr_bO_c$ where X can be lanthanum (col. 5, lines 48-56).

Yamamoto does not specifically teach an elongation of the crystal lattice.

Takeshima teaches that compounds with zirconia replaced by rare earth elements have higher heat resistance than zirconia, and specifically, since only a portion of the added lanthanum replaces the zirconia lattice only few oxygen defects are created, and therefore total replacement with lanthanum has the potential to exhibit a new catalytic function. Takeshima teaches that lanthanum can replace zirconia to synthesize a lanthana-zirconia compound oxide with high surface area and many oxygen defects. One method used is water-in-oil micro emulsion, and in Example 3, the lanthana-zirconia had "exactly the theoretical plane spacing, indicating that La^{3+} ion had almost completely replaced the ZrO_2 lattice" (pars. 49, 52, 73, and 76).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the micro emulsion technique as taught by Takeshima to prepare the zirconium oxide of Yamamoto such that lanthanum substitutes for zirconium in the zirconia lattice in order to achieve improved heat resistance, high surface area, and a desirable oxygen storage function. By forming the composition such that lanthanum substitutes for zirconium in the zirconia lattice as taught by Takeshima, the elongation of the crystal lattice would obviously assume a nearly theoretical value, as claimed.

Regarding claims 2 and 3, Yamamoto teaches the zirconium oxide containing lanthanum in an amount ranging from 1-40 mol % (col. 6, lines 25-28).

Regarding claims 1, 4, and 5, Yamamoto teaches that the zirconium oxide further contains platinum and more preferably further contains at least one element of alkali metals and/or alkaline earth metals including cesium (col. 10, lines 52-65).

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al (JP 2002-079097) in view of Takeshima.

Suzuki teaches a composition expressed as $(Al_2O_3)_a(CeO_2)_b(ZrO_2)_{1-b}(La_2O_3)_d$ (par. 39, par. 40, lines 1-2).

Suzuki does not specifically teach an elongation of the crystal lattice.

Takeshima teaches that compounds with zirconia replaced by are earth elements have higher heat resistance than zirconia, and specifically, since only a portion of the added lanthanum replaces the zirconia lattice only few oxygen defects are created, and therefore total replacement with lanthanum has the potential to exhibit a new catalytic function. Takeshima teaches that lanthanum can replace zirconia to synthesize a lanthana-zirconia compound oxide with high surface area and many oxygen defects. One method used is water-in-oil micro emulsion, and in Example 3, the lanthana-zirconia had "exactly the theoretical plane spacing, indicating that La^{3+} ion had almost completely replaced the ZrO_2 lattice" (pars. 49, 52, 73, and 76).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the micro emulsion technique as taught by Takeshima to prepare the zirconium oxide of Suzuki such that lanthanum substitutes for zirconium in the zirconia lattice in order to achieve improved heat resistance, high surface area, and a desirable oxygen storage function. By forming the composition such that lanthanum substitutes for zirconium in the zirconia lattice as taught by Takeshima, the elongation of the crystal lattice would obviously assume a nearly theoretical value, as claimed.

Regarding claims 2 and 3, Takeshima teaches $LaZrO_{3.5}$, with 50% La content (par. 76).

Regarding claim 4, Suzuki teaches that cesium be carried on the oxide composite (pars. 41-42).

Regarding claim 5, Suzuki teaches that platinum be carried on the oxide composite (par. 57).

Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto (US 5,814,576) or Suzuki et al (JP 2002-079097), each in view of Taniguchi et al (US 2002/0015674).

Yamamoto teaches a zirconium oxide composition represented by the general formula $[X]_aZr_bO_c$ where X can be lanthanum (col. 5, lines 48-56).

Suzuki teaches a composition expressed as $(Al_2O_3)_a(CeO_2)_b(ZrO_2)_{1-b}(La_2O_3)_d$ (par. 39, par. 40, lines 1-2).

Neither Yamamoto nor Suzuki specifically teach an elongation of the crystal lattice.

Taniguchi teaches the abilities to store oxygen and heat resistant properties are enhanced more by doping cerium oxide into zirconium oxide in combination with some other rare earth oxides, particularly lanthanum oxide rather than by forming a solid solution of cerium oxide solely in zirconium oxide. In the conventional oxygen storage materials, however, when cerium oxide or lanthanum oxide are doped in zirconium oxide, the components do not fully dope and thereby give birth to independent cerium

oxide and the like, with the result that the produced solid solution assumes a heterogeneous crystal structure. Taniguchi specifically teaches a composite oxide with a homogeneous tetragonal crystal structure of zirconium oxide, produced by doping cerium oxide and lanthanum oxide into zirconium oxide without forming independent cerium oxide or the like. Taniguchi also teaches that the crystal structure of the zirconium oxide containing cerium and lanthanum is a tetragonal structure of zirconium oxide (pars. 8, 9, and 10).

It would have been obvious to one of ordinary skill in the art at the time of the invention to use the methods of producing a homogeneous tetragonal crystal structure of zirconium oxide as taught by Taniguchi to prepare the zirconium oxides of Yamamoto and Suzuki such that lanthanum or lanthanum and cerium substitute (dope) for zirconium in the zirconia lattice so as to maintain the tetragonal structure of zirconia rather than form a heterogeneous crystal structure. By forming the composition such that lanthanum or lanthanum and cerium substitute for zirconium in the zirconia lattice as taught by Takeshima, the elongation of the crystal lattice would obviously assume a nearly theoretical value, as claimed.

Regarding claims 2 and 3, Yamamoto teaches the zirconium oxide containing lanthanum in an amount ranging from 1-40 mol % (col. 6, lines 25-28).

Regarding claims 1, 4, and 5, Yamamoto teaches that the zirconium oxide further contains platinum and more preferably further contains at least one element of alkali metals and/or alkaline earth metals including cesium (col. 10, lines 52-65).

Regarding claims 2 and 3, Taniguchi teaches that the weight ratio of lanthanum to zirconium is in the range of 1:1.5 to 1:60, preferable 1:1.5 to 1:40 (par. 20).

Regarding claim 4, Suzuki teaches that cesium be carried on the oxide composite (pars. 41-42).

Regarding claim 5, Suzuki teaches that platinum be carried on the oxide composite (par. 57).

Response to Arguments

Applicant's arguments, see pages 4-7, filed November 13, 2008, with respect to the rejection(s) of claim(s) 1-5 under 35 U.S.C. 102(b) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Yamamoto, Suzuki, Takeshima and Taniguchi under 35 U.S.C. 103. The new rejections are made above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Takeshima ('467) teaches micro emulsion techniques to aid in dispersion fro exhaust gas purifying catalysts.

Takeshima ('439) teaches the importance of substituting the tetravalent crystal structure of zirconium oxide with lanthanum.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to COLIN W. SLIFKA whose telephone number is (571)270-5830. The examiner can normally be reached on Monday-Thursday, 10:00AM-4:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Melvin Curtis Mayes can be reached on 571-272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/COLIN W SLIFKA/
Examiner, Art Unit 1793

CS
February 12, 2009

/Melvin Curtis Mayes/
Supervisory Patent Examiner, Art Unit 1793